

**What is Claimed is:**

1. A method of protecting a digital work,  $z$ , during transformation by a transformation function,  $F$ , into presentation data  $F(z)$ , wherein the digital work includes digital content and formatting information, comprising:
  - encrypting the digital work,  $z$ , in accordance with a format preserving encryption scheme,  $E$ ;
  - transforming the encrypted digital work  $E(z)$  into encrypted presentation data,  $F(E(z))$ ; and
  - decrypting the encrypted presentation data,  $F(E(z))$ , in accordance with a decryption function,  $D$ , to obtain the presentation data,  $F(z)$ , wherein  $D(F(E(z))) = F(z)$ .
2. The method of claim 1, wherein the encryption function  $E$  is an additive encryption scheme.
3. The method of claim 2, wherein the additive encryption scheme is selected from the group consisting of Mult, Exp, EG, OU, RSA and compositions thereof.
4. The method of claim 1, wherein  $F$  is any multivariate, integer coefficient affine functions and  $E$  is an additive encryption scheme.
5. The method of claim 1, wherein  $F$  comprises an affine type coordinate transformation in  $x$ - and  $y$ - coordinates of the form  $x' = ax + by + e$  and  $y' = cx + dy + f$ , where  $a, b, c, d, e$ , and  $f$  are coefficients,  $(x, y)$  is the original location of an element in the digital work  $z$  and  $(x', y')$  is the transformed location.
6. The method of claim 1, wherein the digital work comprises a token-based document comprising a dictionary  $T$  of token images, a table of coordinate location

information corresponding to each page of the document, and the transformation function F includes a Lookup routine that accesses the table of coordinate location information.

7. The method of claim 6, wherein the table of coordinate location information is encrypted using an additive encryption scheme and the dictionary of token images is encrypted using any encryption scheme.

8. The method of claim 6, wherein the dictionary T consists of a collection of pairs, each comprising an identifier and an associated token, (id, t), the table of location information comprises a table of tuples, (id, x, y) each comprising an identifier id, an x-coordinate and a y-coordinate for each page of the document, and wherein the transformation function F includes a subroutine Lookup that, given a valid token identifier id, returns its corresponding token image t in T.

9. The method of claim 6, wherein the token images comprise characters and graphics.

10. The method of claim 5, wherein the encryption scheme E encrypts the variables x and y while leaving the coefficients (a, b, c, d, e, f) in the clear.

11. The method of claim 1, wherein the digital work z comprises data x and coordinate information a, wherein the transformation function F converts encrypted data x and coordinate information a into presentation data  $F(a, E(x)) = E(F(a, x))$ .

12. The method of claim 8, wherein E is an additive encryption scheme and any combination of the tuples (id, x, y) may be encrypted by E.

13. The method of claim 8, wherein the location table is encrypted by an additive encryption scheme and the token identifiers are encrypted by a probabilistic encryption scheme.

14. A system of protecting a digital work,  $z$ , during transformation by a transformation function,  $F$ , into presentation data  $F(z)$ , wherein the digital work includes digital content and formatting information, comprising:

an encryption engine for encrypting the digital work,  $z$ , in accordance with a format preserving encryption scheme,  $E$ ;

a transformation function for transforming the encrypted digital work  $E(z)$  into encrypted presentation data,  $F(E(z))$ ; and

a decryption engine for decrypting the encrypted presentation data,  $F(E(z))$ , in accordance with a decryption function,  $D$ , to obtain the presentation data,  $F(z)$ , wherein  $D(F(E(z))) = F(z)$ .

15. The system of claim 14, wherein the encryption function  $E$  is an additive encryption scheme.

16. The system of claim 15, wherein the additive encryption scheme is selected from the group consisting of Mult, Exp, EG, OU, RSA and compositions thereof.

17. The system of claim 14, wherein  $F$  is any multivariate, integer coefficient affine functions and  $E$  is an additive encryption scheme.

18. The system of claim 14, wherein  $F$  comprises an affine type coordinate transformation in  $x$ - and  $y$ - coordinates of the form  $x' = ax + by + e$  and  $y' = cy + dx + f$ , where  $a, b, c, d, e$ , and  $f$  are coefficients,  $(x, y)$  is the original location of an element in the digital work  $z$  and  $(x', y')$  is the transformed location.

19. The system of claim 14, wherein the digital work comprises a token-based document comprising a dictionary T of token images, a table of coordinate location information corresponding to each page of the document, and the transformation function F includes a Lookup routine that accesses the table of coordinate location information.

20. The system of claim 18, wherein the table of coordinate location information is encrypted using an additive encryption scheme and the dictionary of token images is encrypted using any encryption scheme.

21. The system of claim 18, wherein the dictionary T consists of a collection of pairs, each comprising an identifier and an associated token, (id, t), the table of location information comprises a table of tuples, (id, x, y) each comprising an identifier id, an x-coordinate and a y-coordinate for each page of the document, and wherein the transformation function F includes a subroutine Lookup that, given a valid token identifier id, returns its corresponding token image t in T.

22. The system of claim 18, wherein the token images comprise characters and graphics.

23. The system of claim 17, wherein the encryption scheme E encrypts the variables x and y while leaving the coefficients (a, b, c, d, e, f) in the clear.

24. The system of claim 14, wherein the digital work z comprises data x and coordinate information a, wherein the transformation function F converts encrypted data x and coordinate information a into presentation data  $F(a, E(x)) = E(F(a, x))$ .

25. The system of claim 21, wherein E is an additive encryption scheme and any combination of the tuples (id, x, y) may be encrypted by E.

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